

Full Length Research Paper

Assessment of indigenous knowledge of medicinal plants in Central Zone of Tigray, Northern Ethiopia

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This research was initiated to document indigenous knowledge associated with traditional medicinal plants; specifically to identify the plant parts used for medicinal purposes and investigate plant species that are used as medicines for the treatment of human health problems. Twelve traditional healers in the study area were interviewed to gather information on the knowledge and use of medicinal plants used as a remedy for human ailments. The study reported that 16 plant species were commonly used to treat various human ailments. Most of these species (68.75%) were wild and harvested mainly for their leaves and the remedies were administered through oral and dermal. The indigenous knowledge transfer was found to be different. Some traditional healers transfer their indigenous knowledge while others kept the knowledge with them for the sake of secrecy. Most of the traditional healers were found to have poor knowledge on the dosage and antidote while prescribing remedies to their patients. More than one medicinal plant species were used more frequently than the use of a single species for remedy preparations.

Key words: Ethno-botany, Indigenous knowledge, Knowledge transfer, Medicinal plants.

INTRODUCTION

Since time immemorial, people have gathered plant and animal resources for their needs. Examples include edible nuts, mushrooms, fruits, herbs, spices, gums, game, fodder and fibres used for construction of shelter and housing, clothing or utensils, and plant or animal products for medicinal, cosmetic or cultural uses. Even today, hundreds of millions of people, mostly in developing countries, derive a significant part of their subsistence needs and income from gathered plant and animal products (Iqbal, 1993; Walter, 2001). Gathering of high value products such as mushrooms (morels, matsutake and truffles), medicinal plants (ginseng, black cohosh and goldenseal) also continues in developed countries for cultural and economic reasons (Jones et al., 2002). According to the WHO (2001) report, traditional healers such as herbalists, midwives and spiritual healers constitute the main source of assistance with health problems for at least 80% of rural population in developing countries. This unquestionably shows that the populations of developing countries rely heavily on traditional medicine to cope with their health problems (Bannerman, 1983).

Medicinal plants and knowledge of their use provide a vital contribution to human and livestock health care

needs throughout Ethiopia. In Ethiopia, about 80% of human population and 90% of livestock rely on traditional medicine. Ethiopian plants have shown very effective medicinal value for some ailments of humans and domestic animals. The major reasons why medicinal plants are demanded in Ethiopia are due to culturally linked traditions, the trust the communities have in medicinal values of traditional medicine and relatively low cost in using them (Endashaw, 2007). Ethiopia is believed to be home for about 6,500 species of higher plants with approximately 12% endemic, hence making it one of the six plant biodiversity-rich countries of Africa (UNEP, 1995). The greater concentration of medicinal plants are found in the south and south western Ethiopian parts of the country following the concentration of biological and cultural diversity (Edwards, 2001). The various citations made from various written records of medicinal plants from central, north and northwestern part of Ethiopia are thus small fractions of medicinal plants in Ethiopia.

The distribution of knowledge and services of medicinal plants are hierarchically placed. Services are obtained from the family, neighborhood, and village or beyond. Furthermore, there is very little ethno-botanical documen-

tation on most medicinal species in the country. The status of phytomedicine, preparation of crude extracts and isolation of active ingredients is very minimal. The data base for the recorded species of medicinal plants also needs special attention.

The issue of medicinal plant conservation in Ethiopia today calls for aggressive studies and documentation before the accelerated ecological and cultural transformation distort the physical entities and the associated knowledge base (Endashaw, 2007). Derogatory attitudes towards traditional medicine practitioners had forced healers to keep their knowledge and practices to themselves. Moreover, the indigenous knowledge associated with the conservation and use of medicinal plants is also disappearing at an alarming rate.

In Tigray, northern Ethiopia medicinal plants have been used as traditional medicine to treat different human ailments by the local people from time immemorial. Even though there is high expectation of enormous traditional knowledge and use of medicinal plant species, it is not widely used as it could be because the skills are fragile and easily forgettable as most of the medicinal plants are in the hands of a handful and kept as a secret. Therefore, the present study was carried out to assess and document the original knowledge and use of medicinal plant species by traditional healers to treat human ailments in the study area. The study concentrated in identifying the plant parts used for medicinal purposes, document indigenous knowledge of the people on the use of medicinal plants and investigate plant species that are used as medicines for the treatment of human health problems.

MATERIALS AND METHODS

Study area

The study was conducted in and around Adekfurdu, (Figure 1) central zone of Tigray, which is about 223 km from Mekelle, the capital city of Tigray regional state in Ethiopia. Data was collected from September 2008 to April 2009. Clay soil with a thin layer of humus is the main type over the area and shrubs are the characteristic vegetation type of the area. The study area has a dry and hot climate with a mean annual temperature of 22.6°C and annual rainfall that varies from 1000 to 1400 mm (Gidey, 2009). The socio-economic activity of the local population is mixed farming which involves both cultivation of crops and rearing of livestock (Gidey, 2009).

Data collection

Descriptive and quantitative survey methods were used in this study to reveal the medicinal plants and how people are using them in and around Adekfurdu. Ethno-botanical data were collected from 12 traditional healers using semi-structured interview, followed by participant observations. Sample informants were selected based on recommendation from elders and local authorities (development agents and peasant administration officials) of the study area. The traditional healers involved in the study were all males and their ages ranged from 30 up to 84 years. Most of the healer's were illite-

rate (6) and at most only able to read and write (3) while few (2) attained up to standard four and the rest had completed grade 12 and above. Interviews were conducted with each traditional healer about the knowledge and use of medicinal plant species used to treat human diseases in the study area. The healers were not professional practitioners who treat the local people by using ethno-medicinal plants and their products. The interview was conducted in the local language.

Data on human ailments treated, local name of plants used, growth form, degree of management (wild/cultivated), parts used, methods of preparation, route of administration and application, added values of medicinal plants, existing threats to medicinal species and indigenous knowledge transfer were recorded. We accompanied the traditional healers and made field visits to observe and collect medicinal plant species reported to treat ailments. Sample specimens of each medicinal plant species were collected during the field visits and allotted collection numbers. The collected specimens were then dried, identified through the flora of Ethiopia and Eritrea, useful trees and shrubs for Ethiopia and by asking other experts.

RESULTS

The study reported that 16 plant species were commonly used to treat 19 human ailments (Table 1). Most of these species (68.75%) were wild and harvested mainly for their leaves and the remedies were administered through oral and dermal.

Informants reported various skills concerning the preparation of medicines. These include plant composition (whether single or combined), condition of plant used (fresh or dry) and methods of preparation such as crushing and pounding (Figure 2). The result of the condition of plant part used indicated that some (31.57%) were used in the fresh or dried state. As these plants are used in both forms, the chance of using the medicinal plants under different seasons of the year is increased. They reported that, they preserve the plant that they could not find in dry season in different ways like pounding and hanging the plant material. Most of the remedies (57.89%) which were used from the medicinal plant species had additive values while some (31.57%) were used alone to treat different human diseases.

People of the study area used various units of measurement and the duration of administration to determine the dosage. Local units such as finger length (for bark, root, and stem), pinch (for powder) and numbers (for leaves, seeds, and fruits) were used to estimate and fix the amount of medicine. However, majority (66.6%) of the traditional healers had a poor knowledge of dosage. They had no accurate value of the medicines prescribed to patients. They administered the same amount of medicine to people who have the same disease regardless of age, body weight or sex. Among the medicinal plant species, the majority (68.75 %) were wild whereas (6.25%) were both cultivated and/or wild. Few species (25%) were indicated as solely cultivated. The dominant growth forms among the reported medicinal plant species were shrubs and trees.

Thirty three percent of the traditional healers transferred



Figure 1. Map of Tigray regional state of Ethiopia. The site is located in Central Tigray (Source: <http://www.tigraionline.com/tigrayGIF.gif>).

Table 1. List of medicinal pant species, parts used, route of administration and disease treated.

| Species | Disease treated | Parts used | Administration |
|------------------------------|--------------------|----------------|----------------|
| <i>Cordia africana</i> | Urination at night | Sterile branch | Oral |
| <i>Croton macrostachyus</i> | Abiatio | Leaves | Dermal |
| <i>Maesa lanceolata</i> | Scabies | Seeds | Dermal |
| <i>Ocimum lamiifolium</i> | Febrile illness | Leaves | Dermal, oral |
| <i>Vernonia amygdalina</i> | Abiatio | Leaves | Dermal |
| <i>Phytolacca dodecandra</i> | Rabies | Root | Oral |
| <i>Allium cepa</i> | Abdominal ache | Fruits | Oral |
| <i>Dodonaea viscosa</i> | Malaria | Fruits | Dermal |
| <i>Entada abyssinica</i> | Gonorrhoea | Root | Intravenous |
| <i>Maesa lanceolata</i> | Tape worm | Fruits | Oral |
| <i>Ehretia cymosa</i> | Wound root | Root | Dermal |
| <i>Azadirchta indica</i> | Diabetes | Leaves | Oral |
| <i>Eucalyptus globules</i> | Common cold | Leaves | Nasal or oral |
| <i>Allium ursinum</i> | Bronchitis | Leaves | Oral |
| <i>Allium ursinum</i> | Tuberculosis (TB) | Fruits | Oral |
| <i>Albizia lebbeck</i> | Mouth smelling | Root | Dermal |
| <i>Justicia schimperiana</i> | Leg distension | Leaves | Dermal |
| <i>Croton macrostach yus</i> | Yellow fever | Leaves | Oral |
| <i>Calotropis procera</i> | Roughness of skin | Leaves | Dermal |

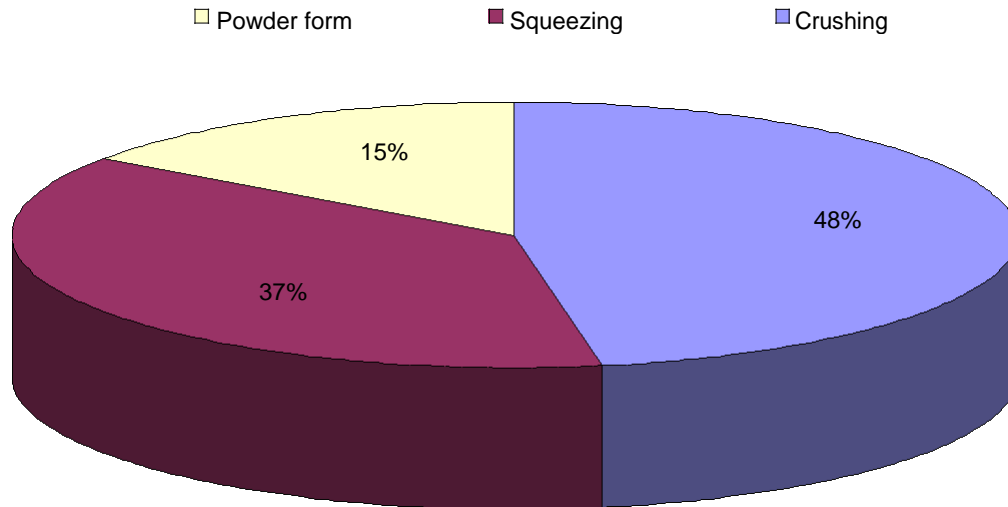


Figure 1. Principal methods of remedy preparations in study area.

their indigenous knowledge only to selected family members while some (50%) kept the knowledge and the remaining (16.7%) do not transfer at all.

Knowledge of traditional healers on dosage of each remedy was poor. The absence of any adverse effects of traditional medicines after administrations was also more frequently mentioned by the traditional healers. But some of the preparations were reported to have some adverse effects like vomiting and temporary inflammations in patients.

Additives like sugar, honey, tea, coffee, edible oil and garlic were used in most (57.89 %) of the remedy preparations.

The majority of the recorded medicinal plant species (*Allium cepa*, *Allium ursinum*, *Eucalyptus globules*, *Cordia africana*, *Croton macrostachyus*, *Maesa lanceolata*, *Phytolacca dodecandra*, *Dodonaea viscosa*, *Entada abyssinica*, *Azadirchta indica*, *Albizia lebbek* and *Calotropis procera*) were reported as abundant (75%) and very rare (25%). The abundance of the reported medicinal plant species also showed variation with their added values. The species were used for fire wood, construction and washing powder as well.

It was reported that the dried latex of *Calotropis procera* was used to treat rough skin (Hafow). It is also indicated that dried leaves, roots and barks were crushed and applied externally to the skin. The twig of sterile *Cordia africana* was believed by traditional healers to stop urination at night by wearing it as a necklace. In addition, the patient should take red honey for five consecutive days.

Seven fruits of *Dodonaea viscosa* were reported to be crushed either freshly or in a dried form and mixed with honey to be eaten for the treatment of malaria. It was emphasized that if a person takes this medicine on the first day of a new year, it will be potent for up to seven years. Local healers alleged that, leaves of *Justicia*

schimperiana crushed, boiled and rubbed on the skin cured leg distension.

The study revealed that roots of sterile *Phytolacca dodecandra* crushed and mixed with 'Tela' and drunk, cured rabies. The side effects of this medicine are vomiting and diarrhea. An antidote often recommended by local healers to patients, is to take a cup of coffee.

Fresh roots of *Allium cepa*, crushed and mixed with honey and orally taken before a meal is said to cure abdominal ache. Additionally, a paste made from roots of *Albizia lebbek* and mixed with wheat dough was applied externally to cure cancer (Naqarsa) wounds.

Juice prepared from pounded and squeezed fresh leaves of *Croton macrostachyus* and *Vernonia amygdalina* were applied as a lotion to cure lesions of patients suffering from abiatto (shererit). The powdered form of the concoction was equally effective for the same disease. Also, a fresh root of *Entada abyssinica*, crushed and squeezed with water was given through hypodermal injection to treat gonorrhoea.

Fresh leaves of *A. indica* crushed and squeezed with water to serve as insulin, was given orally to patients daily for treatment of diabetes. It is important that the glucose concentration remain within normal limits. As insulin, *A. indica* has three primary functions:

- 1) To stimulates liver and muscles to store glucose as glycogen
- 2) To stimulate liver, fat and the muscle cells to take up and metabolize glucose
- 3) To promote the buildup of fats and proteins and inhibit their use as an energy source. It also causes body cells to take up glucose. Therefore, it was administered to patients of diabetes to lower the blood glucose level.

The juice or vapor of fresh leaves of *Eucalyptus globules* whilst boiling has been reported to treat common cold

through nasal dispensation. Next, fresh roots of *Ehretia cymosa*, crushed and squeezed with water were applied externally to heal wounds of affected persons.

One pack of fresh fruits of *Allium ursinum*, crushed and blended with a kilo of honey and butter was orally prescribed to persons suffering from bronchitis and tuberculosis. Furthermore, powder of *Maesa lanceolata* seeds in oil based solution; have been reported to treat scabies. The fresh fruits of this plant were given orally to people with tape worm infection.

Juice from *Ocimum lamiifolium* leaves were recommended for fibroid (minchi) patients. It was also reported that the juice prepared was administered alternatively through dermal to treat the same disease.

Discussion

Traditional medicine had minimal adverse effects with exception of vomiting and inflammations, since the dosage not fixed (in most cases unknown) (Gidey, 2009). Therefore, there is need for traditional healers to undergo training in basic health care delivery.

Traditional healers should be encouraged to transfer their knowledge to interested persons in their communities. As most of the medicinal plants are wild and harvested for their roots to prepare remedies, the healers in consultation with government officials should take care not to eradicate the medicinal plant species altogether. It is advisable to replace these plants to ensure sustainability by establishing nurseries for the common medicinal plants so as to curb deforestation as its associated consequences such as erosion and loss in soil fertility. Awareness creation among the traditional healers and community at large is important in order to preserve the indigenous medicinal plant species. Conservation measures such area closure whereby a ban is placed on farming, grazing, tree felling will help minimize environmental degradation and the attendant global warming (Endashaw, 2007).

In the present study, 16 plant species of medicinal importance were recorded and documented (Table 1). The majority of the reported medicinal plant species were wild. These indicated that the local people harvest more medicinal plant species from the wild than from home gardens.

Many medicinal plant species were also reported to be rare. These need an urgent attention to conserve such resources in order to optimize their use in the primary health care system. Some studies have shown that most of the medicinal plants used in Ethiopia are harvested from the wild (Mirutse, 1999; Tesfaye and Zemedu, 1999).

There are various methods of traditional medicinal plant preparation in the area. The most popular mode of preparation was in the form of crushed which accounts to 48% followed by 37% of squeezed and 15% Powdering (Figure 2). This result is different with the finding of Fisseha Mesfin (2007), in which 32 (36.4%) preparations

were made in the form of powder, 29 (32.9%) followed by crushed and pounded, and 12 (11.3%) in the form of chewing of plant parts used for treatment of human health problems.

Tesfaye and Zemedu (1999) reported that 71% of the medicinal plants of the 'Berta' people in western Ethiopia are obtained from the wild vegetation. Zemedu (1997) reported that only 6% of the plants maintained in home gardens in Ethiopia are primarily cultivated for their medicinal value even though many other plants grown for non-medicinal purposes turn out to be important medicines when some health problems are encountered.

A rich heritage of indigenous medicinal plants use and knowledge was also recognized. However, the knowledge and use of these plants were not documented; they are only transmitted from generation to generation verbally. According to Alcorn (1984), indigenous knowledge develops and changes with time and space. Ethno-medicinal knowledge involves traditional diagnosis, collection of raw materials preparation of the indigenous knowledge on plant remedies in many countries including Ethiopia; pass from one generation to the other generation verbally with great secrecy. Such secret and verbal transfer makes the indigenous knowledge or ethno-medicinal knowledge vulnerable to distortion and in most cases some of the lore is lost at each point of transfer (Amare, 1976), hence the need for systematic documentation of such a useful knowledge now-a-days through ethno-botanical research.

Traditional healers were found to play an important role in the primary health care system of the local people as they treat resource people who had little access and could not afford the cost of modern medication. According to Sofowora (1982) about 65-85% of the populations in every country of the developing world rely on traditional medicine because of lack of certain infrastructures like hospitals and health centers. Since medicinal plants are the main, often only source of traditional medicine for the rural population and are of high demand in the health care systems of this population when compared to modern medicine, ethno-medicine activities need special consideration and back-up (Abbiw, 1996). This is partly because modern medicinal services are either unaffordable or unavailable to the vast majority of local people due to their skyrocketing cost coupled to lack of transport to and from health care centers.

It was observed that the local healers did not have enough awareness about cleanness of the equipments which are used to prepare the medicines. Also, their storage facilities were not entirely clean, thus, exposing the environment to various communicable diseases. The healers did not have certificates for their medicines and they did not work in cooperation with therapeutic professionals for the preparation of their medicine.

Similar studies conducted in Ethiopia, Uganda, Serbia and northern Peru (Haile, 2005) indicated that most medicinal plant species used to treat human ailment were wild. This implies that the majority of plants of medical

importance were not yet identified and cultivated by traditional healers.

The informants' responses indicated that there were variations in the unit of measurement, duration and time at which remedies are taken and rescribed by healers for the same kind of health problems. Amare Getahun (1976), Sofowora (1982), and Dawit Abebe (1986) have also discussed lack of precision and standardization as one drawback for the recognition of the traditional health care system.

Moreover, the materials and instruments that the traditional healers used to treat patients may become a means of spreading different diseases especially when they are administering medicines by syringes. I doubt if they are cognizant of any sterilization methods so as to prevent the spread of communicable diseases like HIV/AIDS. The traditional healers had no any sophisticated materials like stethoscopes and thermometers to diagnose their patients. They simply test their patients verbally and prescribe medicine. One of the major setbacks with verbal diagnosis is that the patients might have diseases other than the prescribed ones as different diseases, show similar symptoms. So the patient might be given a wrong medicine that may adversely affect him.

The indigenous knowledge among traditional healers with regard to their age and educational level was different. This could be attributed to equal access of their family members to the existing indigenous knowledge regardless of age and educational level. The proportion of healers who used to transfer their knowledge and those who did not was different that is the proportion of healer who used to transfer the knowledge was less than that of the healers who did not use to transfer. This reveals that some of the traditional healers might have given much attention to the indigenous knowledge transfer while most of them kept the knowledge secret.

The mode of administration is mainly through oral and dermal. In the study area, 19 ailments were reported to be treated by 16 traditional medicinal plants of the area. Traditional medicinal plants are harvested mostly from wild stands followed by home gardens. Leaves were found to be the most frequently used plant parts followed by roots and fruits for preparation of human remedies.

The indigenous knowledge and skill of traditional medicine practitioners must be encouraged and protected. This could be the way through which such people could exercise their knowledge boldly. Encouraging people to grow medicinal plants in the home gardens, mixing with crops in farmlands and live fences is paramount important.

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